110 Fieldcrest Avenue, #8, 6th Floor
Edison, New Jersey 08837
tel: 732-225-7000
fax: 732-225-7851

January 11, 2018

Mr. Fred Mumford
Section Chief, BEMSA
Superfund Coordinator
NJDEP-BEMSA
Mail Code 380-01
380 Scotch Road
West Trenton, NJ 08628

PROJECT: Contract No. W912DQ-15-D-3013
Task Order No. 008
Puchack Well Field Superfund Site
Pennsauken, New Jersey

SUBJECT: Classification Exception Area

Dear Mr. Mumford:

CDM Federal Programs Corporation (CDM Smith) is pleased to submit one hardcopy and one compact disc Classification Exception Area/Well Restriction Area (CEA/WRA) Fact Sheet Form for the Puchack Well Field Superfund Site located in Pennsauken, New Jersey. The CEA occupies nearly 540 acres, with a duration of 85 years based upon fate and transport modeling. A summary of the fate and transport modeling is provided as part of the CEA application (Attachment 2).

Regarding water use (Section C of the CEA/WRA Fact Sheet), a well search has not been performed in strict accordance with NJDEP well search procedures. However, the United States Environmental Protection Agency (EPA) has identified private wells over the years, and has been actively mitigating contaminated groundwater plumes.

Regarding public notification (Section E of the CEA/WRA Fact Sheet), EPA has performed, and continues to perform, community relations with Pennsauken Township throughout the Superfund process; therefore, notifications of the CEA will not be mailed to property owners or local/county agencies.

If you have any questions, please contact Lucinda Pype at 717-437-3701.

Sincerely,
CDM FEDERAL PROGRAMS CORPORATION

Frank Tsang, PE, BCEE
Project Manager

cc: N. Higginbotham, USACE
J. Gorin, EPA
L. Pype, CDM Smith

Contract No.: W912DQ-15-D-3013
Task Order 008

US Army Corps of Engineers
Kansas City District

Classification Exception Area

Puchack Well Field

Superfund Site

Pennsauken, Camden County, New Jersey

January 11, 2018

CDM Smith

New Jersey Department of Environmental Protection
Site Remediation Program

CLASSIFICATION EXCEPTION AREA / WELL RESTRICTION AREA (CEA/WRA) FACT SHEET FORM

Date Stamp
(For Department use only)

SECTION A. SITE INFORMATION

Site Name: Puchack Well Field Superfund Site

Program Interest (PI) Number(s): G000005490

Case Tracking Number(s) for this submission: _____

This form must be attached to the Cover / Certification Form if not submitted through the RIR Online Service

1. Indicate the reason for submission of this form *(see instructions)*:

☒ New CEA ☐ Revise CEA ☐ Reestablish CEA ☐ Existing CEA with no changes
☐ CEA for historic fill ☐ CEA lift/removal

If you are submitting this form for an existing CEA provide the CEA Subject Item ID: _____

2. Indicate the type of ground water Remedial Action (RA):

☐ Natural ☒ Active ☐ Final RA not yet selected

3. Is this form being submitted with a Remedial Action Permit (RAP) Form (for Soil or Ground Water)? ... ☐ Yes ☒ No

SECTION B. CEA COMPONENT INFORMATION

1. **Contaminant(s):** This CEA/WRA applies only to contaminants above applicable numeric values established by the Ground Water Quality Standards (GWQS), N.J.A.C. 7:9C, listed in the table below. Except for historic fill CEAs based on assumed ground water contamination, list the maximum contaminant value for all ground water data that could be representative of current conditions and is for any well or sampling point used to establish the CEA. The values listed below may or may not be appropriate for use in evaluating plume fate and transport. See form instructions.

Contaminant	Concentration (1)	GWQS (2)	SWQS(3)	GWSL(4)
Chromium	22,000	70		
Sodium	2,390,000	50,000		

Notes:
(1) Maximum concentration in Micrograms Per Liter
(2) New Jersey Ground Water Quality Standards, N.J.A.C. 7:9C
(3) Surface Water Quality Standards, N.J.A.C. 7:9B - Applicable only where contaminants in the CEA may discharge to a surface water body.
(4) Current NJDEP Vapor Intrusion Ground Water Screening Levels available at http://www.nj.gov/dep/srp/guidance/vaporintrusion/

☐ Check if attaching an Addendum to list additional contaminants and associated information.

2. **CEA Boundaries:** Year of tax map used: 2016

For CEA revisions: ☐ check if CEA Boundary has changed (*See instructions*)
☐ check if Block and Lot numbers have changed (*See instructions*)

List the Block(s) and Lot(s) included in the areal extent of the Classification Exception Area:

Block(s)	Lot(s)	Check if off-site
See Attachment 1		☐
		☐
		☐
		☐
		☐

Block(s)	Lot(s)	Check if off-site
		☐
		☐
		☐
		☐
		☐

☒ Check if attaching an Addendum to list additional Blocks/Lots and associated information.

Narrative description of proposed CEA:

The CEA is comprised of a widespread chromium plume originating from the SGL Modern Hard Chrome Facility. The plume has migrated off site, and the CEA occupies 539.65 acres within the Township of Pennsauken, in the area east and south of the Betsy Ross Bridge. The present extent of the plume is delineated horizontally and vertically by actual groundwater data; groundwater modeling was used for the fate and transport evaluation to determine CEA duration and extent, as summarized in Attachment 2. The CEA extends approximately 6,000 feet northeast of the SGL site, and 7,000 feet east-southeast of the SGL site. The CEA is not associated with historic fill.

Name(s) of the affected Geologic Formation(s)/Unit(s): Potomac and Magothy Formations, PRM Aquifer System

Direction of ground water flow: mult./north (*If multiple water bearing zones exist within the CEA and/or there is no predominant flow direction, see instructions.*)

Ground Water Classification: IIA (*See instructions and GWQS for classification area information.*)

Vertical Depth of CEA: 220 (ft bgs) **and** -185 (msl).

Horizontal Extent of CEA: 539.65 Indicate units: ☒ acres or ☐ square feet

3. Projected Term of CEA: (*Based on modeling/calculations in the fate and transport description*)

Proposed Duration in Years: 85 Anticipated Expiration Date: 01/01/2103

or ☐ Indeterminate (*Review instructions before selecting* "Indeterminate.")

4. ATTACH AND/OR SUBMIT THE FOLLOWING: (*see instructions for additional information*)

Exhibit A: Site Location Maps – USGS Quadrangle Map;

Exhibit B: CEA Map and Cross Section Figure – See N.J.A.C 7:26C- 7.3(c)1 and 2 and instructions regarding what to include on the map and the cross-section figure.

Exhibit C: GIS Deliverables – CEA Boundary Extent Map. The CEA Boundary Extent Map shall be submitted via email to srpgis_cea@dep.nj.gov. See the instructions for detailed GIS deliverable requirements.

For revisions, does the attached map differ from the CEA map on NJ-GeoWeb? ☐ Yes ☐ No ☒ N/A

If "Yes or N/A," identify the format of the CEA Boundary Extent Map: ..... ☒ Shape File ☐ CAD File

SECTION C. CURRENT GROUND WATER USE DOCUMENTATION

1. Indicate the year of the most recent well search completed per N.J.A.C. 7:26E-1.14: DataMiner and 5-Mile Radius Search Performed in 2017
2. If this Fact Sheet form is for a revised CEA or an existing CEA with no changes, have new wells been installed since the CEA was established? ..... ☐ Yes ☐ No ☒ N/A
3. Are there any pumping wells (e.g., potable, industrial, irrigation or recovery wells) within the foot print of the CEA? ..... ☒ Yes ☐ No

SECTION D. WELL RESTRICTION INFORMATION

Certain well restrictions relevant to potable ground water use, such as "Double Case Wells", "Sample Potable Wells", and "Evaluate Production Wells", are consistently set within the boundaries of all CEAs established by the NJDEP in Class I and II-A areas (*see instructions*).

1. Are there any other site-specific well restrictions relevant to potable ground water use that should be set within or near the boundaries of the proposed CEA?..... ☒ Yes ☐ No

   If "Yes", describe below any such site-specific well restrictions proposed for this CEA:

   Carefully consider stratigraphy and groundwater quality in the area of proposed potable wells. Aquifers below the upper water table aquifer (A-1) exceed groundwater standards in various areas of the site. Contaminated strata include: Middle Aquifer Upper Sand) (A-2A), Middle Aquifer Lower Sand (A-2B), Intermediate Sand (C-2AI), Lower Aquifer Upper Zone (A-3A), Lower Aquifer Middle Zone (A-3B) and Lower Aquifer Lower Zone (A-3C), and the intervening confining units. If a well is to penetrate through a contaminated interval and underlying confining unit to a deeper aquifer unit, double casing at the underlying confining unit is required, and the groundwater should be analyzed for chromium and sodium.

SECTION E. PUBLIC NOTIFICATION REQUIREMENTS

See form instructions for notification procedures

1. Indicate which of the following entities have been notified pursuant to N.J.A.C. 7:26C-7.3(d). (*check all that apply*)
   - ☐ Municipal and county clerk(s)
   - ☒ Local, county or regional health department(s)
   - ☐ Designated County Environmental Health Act agency (if applicable)
   - ☐ County Planning Board
   - ☐ Pinelands Commission (if applicable)
   - ☐ Owners of real property overlying CEA foot print

2. **List of Names and Addresses** – List below and/or in an attachment, the names/addresses of all persons notified pursuant to N.J.A.C. 7:26C-7.3(d) based on the proposed CEA boundaries. If the site property owner differs from the person responsible for conducting the remediation, enter the site owner's name and address first in below table. See instructions for more information regarding address list and indicating if vapor intrusion was evaluated for properties over the CEA.

   ☐ Check here if no volatile contaminants are in the CEA

Entity or Owner Name	**Notification Address Used** (include applicable block and lot overlying CEA if owner address differs from property address)	**Date notification sent**	**Was property evaluated for vapor intrusion?** Check if "Yes"
Notification via USEPA Public Outreach			☐ VI Evaluation not applicable to site contaminants
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐
			☐

ADDENDUM
Classification Exception Area / Well Restriction Area
Fact Sheet Form

Section B. CEA Component Information

1. **Contaminant(s):** This CEA/WRA applies only to contaminants above applicable numeric values established by the GWQS, N.J.A.C. 7:9C, listed in the table below. Except for historic fill CEAs based on assumed ground water contamination, list below the maximum contaminant value for all ground water data that could be representative of current conditions using any well or sampling point used to establish the CEA. The values listed below may or may not be appropriate for use in evaluating plume fate and transport. See form Instructions.

Contaminant	Concentration (1)	GWQS (2)	SWQS(3)	GWSL(4)

Notes:
(1) Maximum concentration in Micrograms Per Liter
(2) New Jersey Ground Water Quality Standards, N.J.A.C. 7:9C
(3) Surface Water Quality Standards, N.J.A.C. 7:9B - Applicable only where contaminants in the CEA may discharge to a surface water body.
(4) Current NJDEP Vapor Intrusion Ground Water Screening Levels

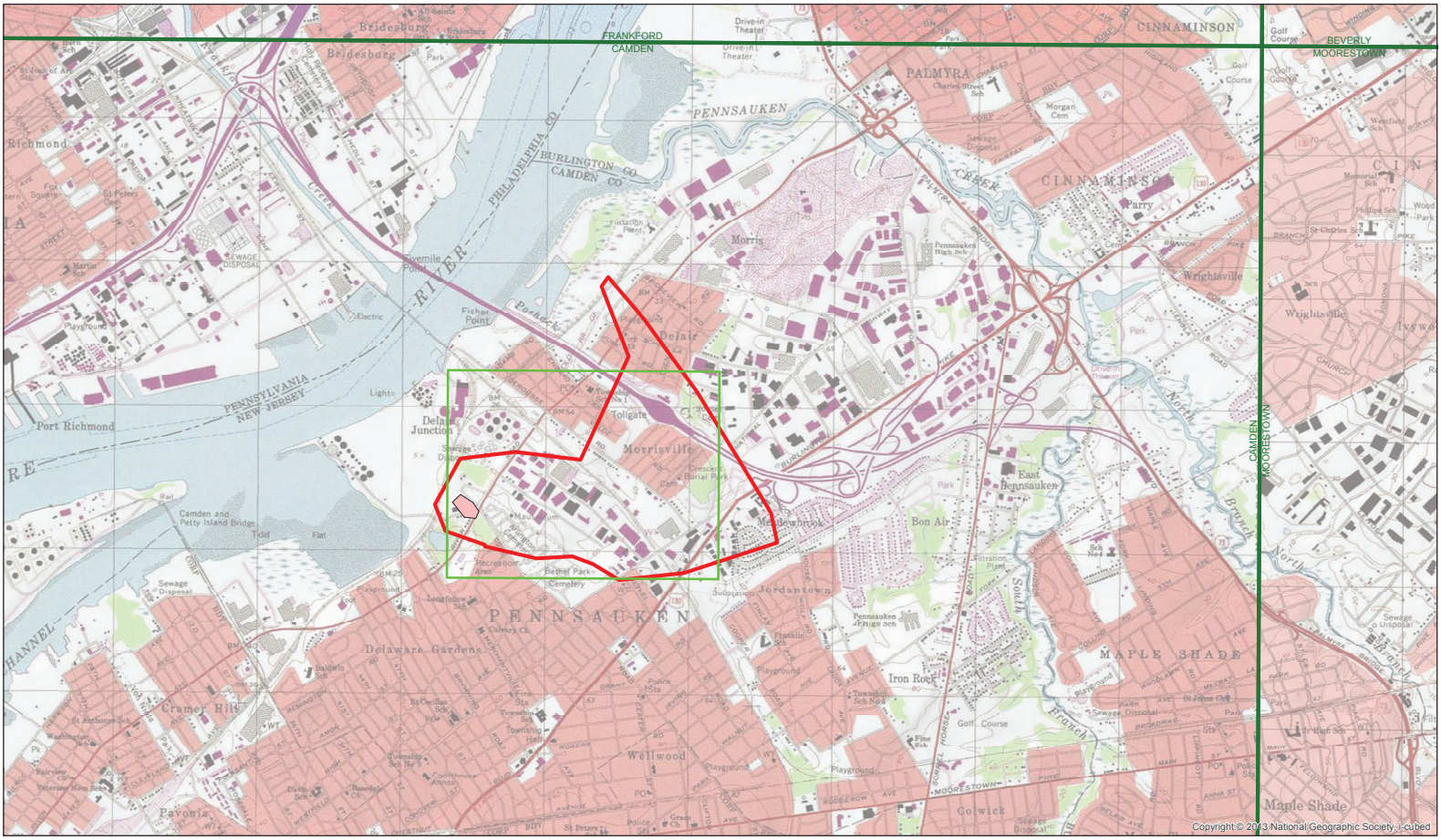
2. **CEA Boundaries:**

See Attachment 1

Blocks(s) and Lot(s) included in the areal extent of the Classification Exception Area:

Year of tax map used: _____ For CEA revisions, check here if Block and Lot numbers have changed: ☐

Block(s)	Lot(s)	Check if off-site	Block(s)	Lot(s)	Check if off-site
		☐			☐
		☐			☐
		☐			☐
		☐			☐
		☐			☐
		☐			☐
		☐			☐
		☐			☐
		☐			☐



Feet
0 1,000 2,000 4,000

Site Location
SGL Modern Hard Chrome Facility
USGS 7.5 Minute Quad Boundary
CEA Boundary

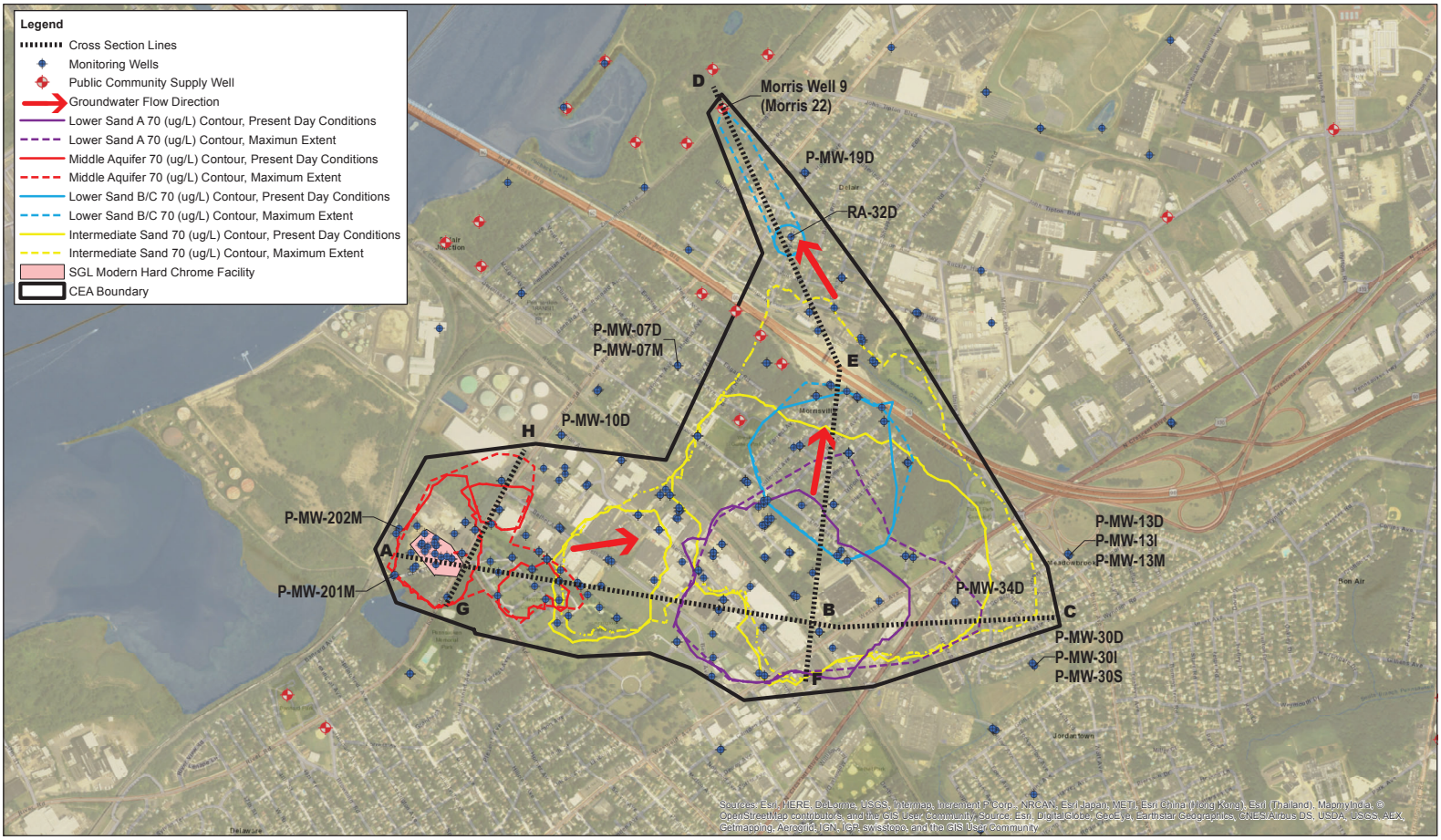
CDM Smith

angellja G:\219174_Puchack\02_MXD\ExhibitA_SiteLocationQuad.mxd 12/26/2017

Exhibit A

USGS 7.5 Minute Quad Site Location

Puchack Well Field Superfund Site
Pennsauken Township, New Jersey



N

Feet
0 500 1,000 2,000

CDM Smith

angellja G:\219174_Puchack\02_MXD\ExhibitB_HorizontalCEAextent.mxd 12/26/2017

Exhibit B1

Chromium Plumes and CEA Extent

Puchack Well Field Superfund Site
Pennsauken Township, New Jersey

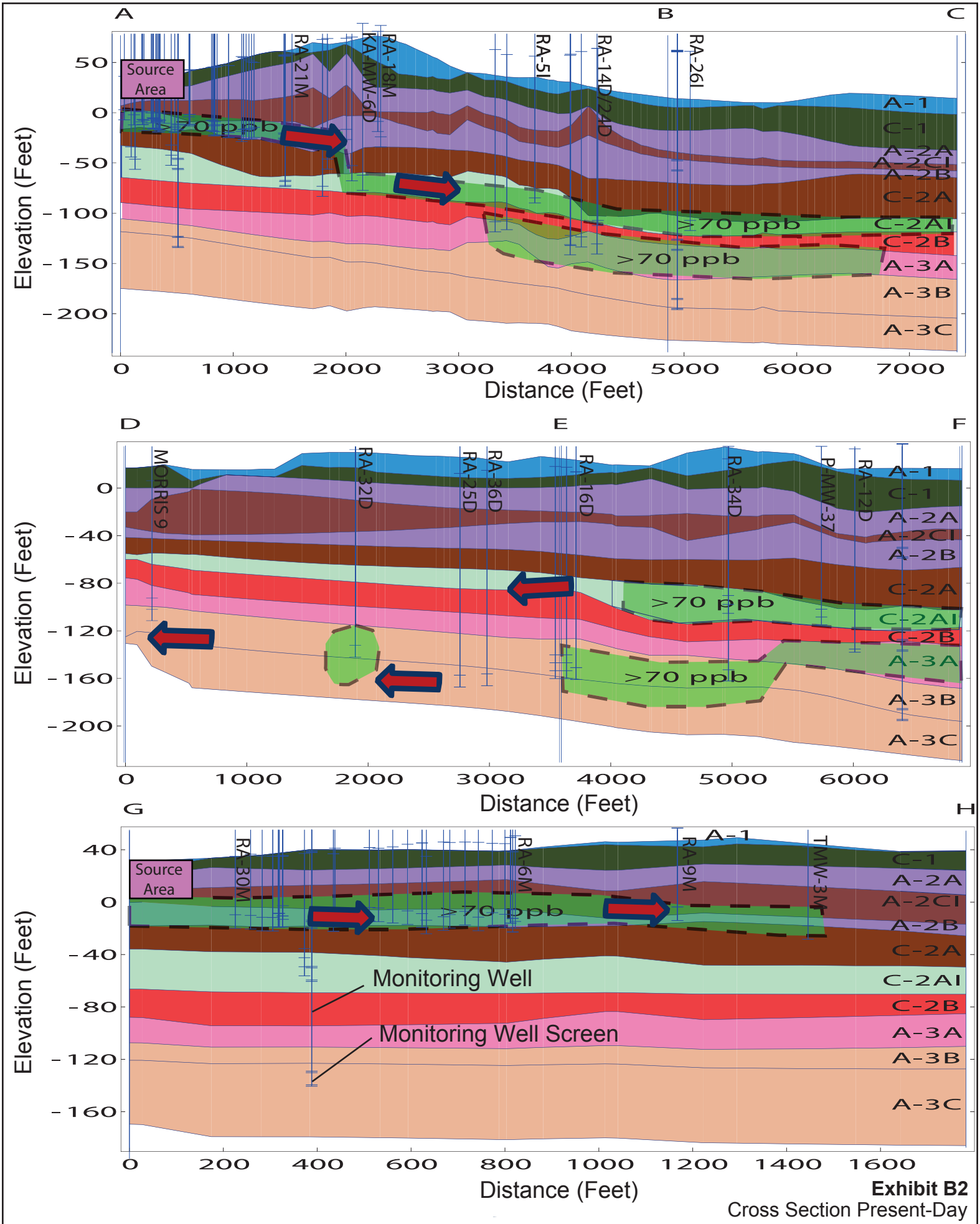


Exhibit B2
Cross Section Present-Day Chromium Extent

Puchack Well Field Superfund Site
Pennsauken Township, New Jersey

CDM Smith

G:\219174_Puchack\02_MXD\CrossSectionExhibitB2.pdf

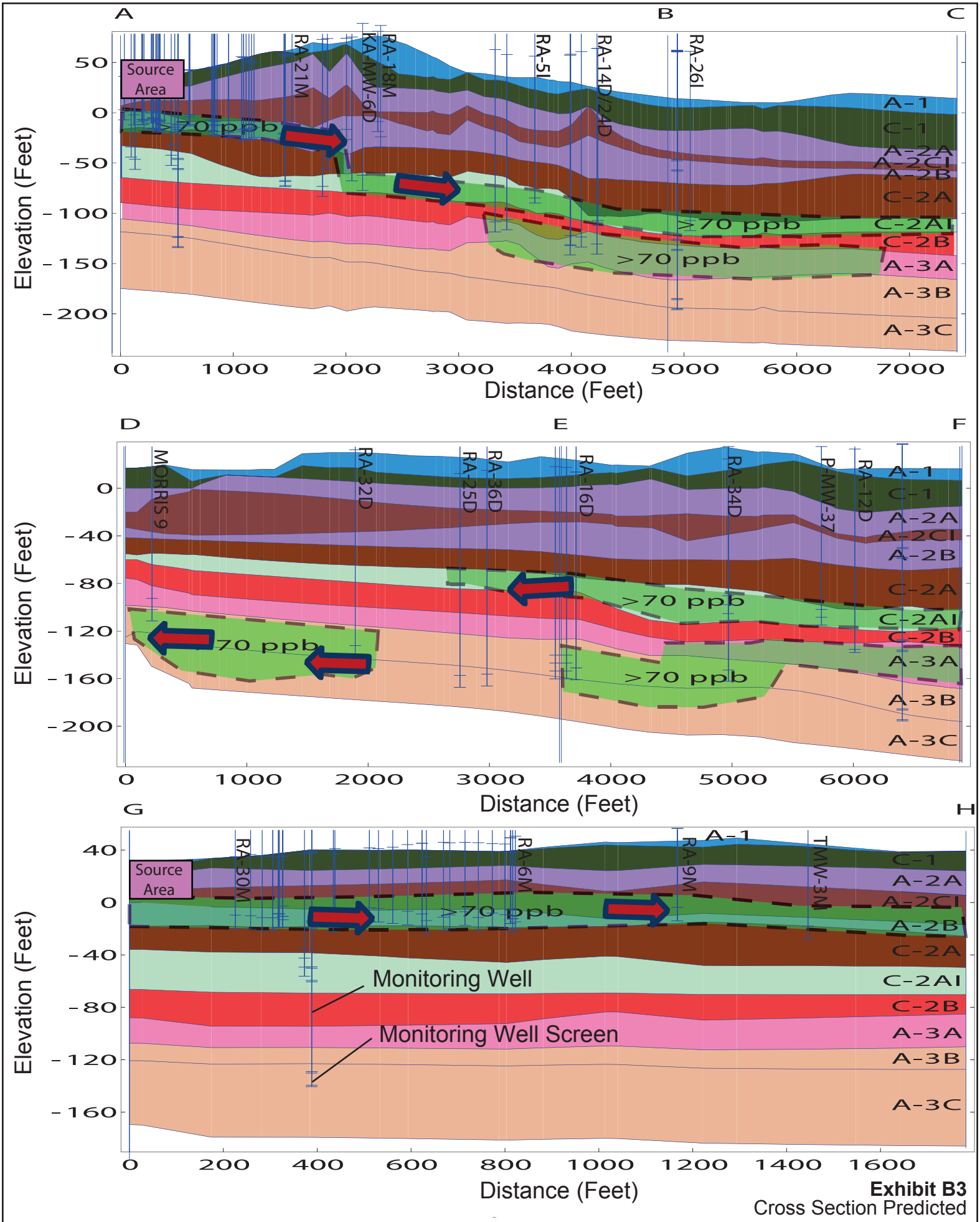


Exhibit B3
Cross Section Predicted Chromium Extent

Puchack Well Field Superfund Site
Pennsauken Township, New Jersey

CDM Smith

G:\219174_Puchack\02_MXD\CrossSectionExhibitB3.pdf

ATTACHMENT 1

PROPERTIES WITHIN AREAL EXTENT OF CEA

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
1405	2	√
1405	24	√
1506	6.01	√
1404	16	√
1104	26	√
1405	19	√
1407	33	√
1102	6	√
1407	15	√
1102	19	√
2307	15	√
501	65	√
1607	7	√
1410	3	√
1407	26	√
1506	8	√
1513	8	√
1606	21	√
1514	13	√
1403	17	√
1510	6	√
1505	1	√
1102	15	√
1315	6	√
1315	12	√
1317	8	√
1315	5	√
1407	24	√
2205	8	√
2312	10	√
1407	17	√
1412	1	√
1413	5	√
1514	11	√
1512	1	√
1101	7	√
1510	5	√
1611	17	√
2305	5	√
2311	20	√

BLOCK	LOT	Check if Off-Site
1412	7	√
1611	16	√
2307	7	√
1102	10	√
1411	13	√
1509	12	√
1509	13	√
1513	7.01	√
1407	8	√
2306	7	√
2306	4	√
1510	16	√
1410	13	√
1606	13	√
1606	10	√
2313	3	√
1404	10	√
1412	12	√
1509	2	√
1514	14	√
2305	28	√
1403	14	√
2206	9	√
1001	14	√
1407	11	√
1104	49	√
1317	13	√
1101	13	√
1412	6	√
1408	12	√
1409	15	√
1408	2	√
1410	12	√
1407	29	√
1412	8	√
2307	12	√
1611	20	√
1502	2	√
1509	16	√
1506	2	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
1409	8	√
1407	34	√
1407	21	√
1514	10	√
2312	4	√
1702	1	√
1409	14	√
1409	1	√
1315	10	√
2205	1	√
1402	10	√
1403	7	√
1404	4	√
1508	5	√
1701	1	√
1104	41	√
1407	7	√
2305	30	√
1405	10	√
1412	11	√
1411	2	√
1104	36	√
2205	5	√
1314	2	√
1314	1	√
1001	10	√
1507	11	√
1407	28	√
2306	5	√
1402	18	√
1316	1	√
2301	1	√
1606	6	√
1607	6	√
1409	6	√
1002	2	√
2305	29	√
1509	4	√
1101	14	√
1611	24	√
2306	6	√
1606	18	√
1407	27	√

BLOCK	LOT	Check if Off-Site
1314	12	√
1409	7	√
1407	36	√
1316	13	√
1412	5	√
2313	5	√
2206	11	√
2312	14	√
1510	13	√
1405	22	√
1411	15	√
1413	7	√
1405	6	√
502	1	√
1606	15	√
2307	9	√
1407	14	√
2206	10	√
1405	12	√
1405	17	√
1408	1	√
1411	4	√
1412	9	√
1407	31	√
1405	16	√
1407	12	√
1102	25	√
1409	3	√
1507	4	√
1406	6	√
1511	1	√
1104	50.04	√
1102	5	√
2307	10	√
1409	12	√
1102	16	√
2307	11	√
1104	38	√
1413	8	√
1315	3	√
1505	8	√
1512	3	√
1104	45	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
2307	14	√
2305	20	√
1104	28	√
1405	3	√
1405	25	√
1404	6	√
1412	21	√
1408	6	√
2305	16	√
1510	11	√
1407	3	√
1402	3	√
1402	2	√
1401	1	√
1606	16	√
1316	4	√
1404	19	√
1510	2	√
2307	13	√
2312	2	√
1403	20	√
1401	6	√
1001	2	√
2101	4	√
1403	15	√
1402	9	√
1402	13	√
1402	15.01	√
1606	1	√
1507	12	√
1512	2	√
1505	2	√
1102	4	√
1601	1	√
1505	6	√
1001	5	√
1611	21	√
501	3	√
1401	3	√
1410	2	√
1411	5	√
1402	16	√
1402	11	√

BLOCK	LOT	Check if Off-Site
1509	5	√
2206	12	√
1607	9	√
1506	10	√
1104	44	√
1509	1	√
1401	5	√
1505	3	√
1510	14	√
1104	30	√
1412	23	√
2305	22	√
1511	3	√
1407	38	√
1104	40	√
2305	4	√
1606	7	√
1506	11	√
1404	3	√
2306	9	√
1409	10	√
1508	3	√
1407	13	√
1514	8	√
1404	18	√
1403	3	√
1509	14	√
2305	6	√
2301	2	√
1407	2	√
2311	12	√
1509	7	√
1611	19	√
2305	8	√
1002	1	√
1506	6	√
1513	4	√
2205	7	√
1102	22	√
502	3	√
2301	5	√
2312	11	√
1506	16	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
1104	27	√
1505	4	√
1509	18	√
1509	11	√
1606	20	√
1606	2	√
1407	20	√
1002	6	√
2313	2	√
2307	8	√
1105	4	√
1404	1	√
1315	11	√
2302	2	√
1001	15	√
2305	12	√
1104	39	√
1606	4	√
1607	16	√
1412	14	√
1405	4	√
1316	11	√
7004	11	√
1305	4	√
1002	3	√
502	2	√
1315	1	√
1317	11	√
1510	10	√
1314	1.01	√
1314	3	√
1103	3	√
1408	5	√
1317	9	√
1606	17	√
1606	5	√
1407	23	√
1002	8	√
1410	4	√
1104	50.03	√
2305	17	√
1104	50.06	√
1607	12	√

BLOCK	LOT	Check if Off-Site
1506	15	√
2312	8	√
1314	6	√
1507	13	√
1507	7	√
1406	4	√
1405	21	√
1411	1	√
1508	6	√
1412	4	√
1102	12	√
1511	2	√
2303	4	√
1406	3	√
1103	2	√
1404	12	√
1104	51	√
2313	7	√
1514	12	√
2307	6	√
1314	10	√
1316	3	√
1513	9	√
1104	50.05	√
1407	39	√
1513	5	√
1102	3	√
1403	10	√
1407	1	√
1412	19	√
1407	37	√
1101	1	√
1409	4	√
1606	14	√
1606	8	√
1412	18	√
1509	9	√
1509	6	√
1403	9	√
1411	10	√
1607	13	√
1404	21	√
1607	2	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
1404	9	√
1102	20	√
1405	28	√
1509	17	√
1508	1	√
1506	17	√
1505	9	√
1408	4	√
1101	2	√
2305	3	√
1507	2	√
1405	26	√
502	17	√
1102	21	√
1410	8	√
1410	5	√
2303	2	√
2304	2	√
1606	12	√
1511	4	√
2305	15	√
2301	4	√
1607	15	√
2305	26	√
2312	6	√
1404	20	√
2315	1	√
2305	14	√
1305	1	√
1611	14	√
1002	5	
1409	13	√
1409	2	√
1317	7	√
1314	5	√
1306	1	√
1411	8	√
1411	9.01	√
1509	10.01	√
1512	4	√
1508	4	√
2301	3	√
1406	7	√

BLOCK	LOT	Check if Off-Site
1412	20	√
1408	3	√
1509	10	√
1407	4	√
2205	3	√
501	4	√
1411	11	√
1606	22	√
1407	10	√
1105	2	√
1104	33	√
1101	9	√
1101	12	√
1510	3	√
1403	12	√
1509	8	√
2204	1	√
2205	6	√
2312	3	√
1404	8	√
1307	1	√
1514	9	√
1407	5	√
1506	13	√
1405	23	√
2305	21	√
1412	17	√
1410	15	√
1104	50.01	√
1104	37	√
501	2	√
1412	3	√
1408	13	√
1607	3	√
1403	2	√
1510	15	√
1402	8	√
1412	16	√
1102	24	√
1104	46	√
1404	14	√
2306	8	√
1105	1	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
2312	9	√
1402	12	√
1102	1	√
1401	4	√
1104	50	√
1410	6	√
1409	5	√
1510	18	√
1506	3	√
1002	4	√
1402	7	√
1403	5	√
1305	3	√
1506	7	√
1105	3	√
2304	1	√
1101	10	√
1509	19	√
2311	19	√
1407	18	√
1611	15	√
2305	19	√
1606	3	√
1611	18	√
1001	1	√
1607	8	√
1314	9	√
2205	4	√
1102	2	√
1510	9	√
2305	18	√
1403	8	√
1102	11	√
1413	1	√
2308	11	√
1315	8	√
1002	11	√
1317	12	√
1401	2	√
1315	9	√
1402	20	√
1510	7	√
1601	4	√

BLOCK	LOT	Check if Off-Site
1104	29	√
2308	10	√
1102	17	√
1104	43	√
1405	15	√
1606	11	√
2308	13	√
1510	8	√
1402	14	√
2303	1	√
1502	1	√
1412	22	√
1506	14	√
2312	1	√
1102	13	√
1407	22	√
1104	34	√
1411	3	√
2305	9	√
1413	9	√
2308	12	√
2302	1	√
2313	6	√
1410	1	√
1407	30	√
1601	3	√
1411	7	√
1607	14	√
1510	4	√
1506	9	√
1402	5	√
1403	18	√
1403	4	√
1509	15	√
1510	17	√
1407	6	√
1508	7	√
1507	3	√
2305	24	√
1411	6	√
1410	9	√
2313	1	√
1101	11	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
1105	5	√
2101	3	√
1303	1	√
1302	1	√
1001	11	√
1408	10	√
1507	8	√
1411	9	√
2206	1	√
1410	11	√
1405	27	√
1404	17	√
1403	6	√
1001	8	√
1509	20	√
1507	1	√
2305	13	√
2305	10	√
1102	14	√
502	18	√
1403	21	√
1513	6	√
501	5	√
1506	4	√
1509	3	√
1410	7	√
1409	11	√
1104	50.02	√
1408	9	√
1409	9	√
1408	14	√
2313	4	√
2312	12	√
1314	8	√
1406	5	√
1316	6	√
7004	9	√
1102	23	√
1410	10	√
1408	16	√
1407	19	√
7004	8	√
1003	3	√

BLOCK	LOT	Check if Off-Site
1403	11	√
1405	13	√
1601	6	√
1405	20	√
1412	2	√
1413	6	√
1407	35	√
1001	6	√
2305	7	√
1315	4	√
1408	8	√
1601	5	√
1410	14	√
1001	7	√
2306	10	√
1101	5	√
1104	25	√
1101	6	√
1308	10	√
1403	19	√
1402	17	√
1102	18	√
2305	27	√
2312	7	√
2303	3	√
1607	4	√
1412	10	√
1407	32	√
1507	14	√
1405	18	√
1101	8	√
1001	13	√
1102	9	√
1607	11	√
1606	9	√
1001	4	√
1510	2.01	√
1405	11	√
1101	3	√
1506	5	√
1601	7	√
1405	7	√
1505	5	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
1412	13	√
7001	1	√
1316	7	√
1002	10	√
1611	23	√
1408	7	√
1402	4	√
2312	5	√
1404	15	√
1403	13	√
1001	3	√
1101	4	√
1607	5	√
1104	47	√
1407	9	√
1314	7	√
1508	2	√
1404	13	√
1406	2	√
1317	6	√
1402	6	√
1413	10	√
2305	25	√
1510	12	√
2311	18	√
1104	48	√
1316	5	√
1404	5	√
1314	11	√
1611	22	√
2305	11	√
2305	23	√
1507	6	√
2206	8	√
1408	15	√
1001	12	√
1405	8	√
1411	14	√
1606	19	√
1404	11	√
1412	15	√
1506	9.01	√
1607	10	√

BLOCK	LOT	Check if Off-Site
1402	1	√
1317	10	√
2312	13	√
1104	32	√
1405	5	√
1413	3	√
1403	1	√
1315	7	√
2101	5	√
1601	2	√
1104	42	√
1606	23	√
1506	1	√
1304	1	√
1103	1	√
501	1	√
1001	16	√
1506	12	√
1510	19	√
1404	2	√
1403	16	√
1402	19	√
1401	5.01	√
1402	15	√
1412	5.01	√
1513	7	√
1316	8	√
1405	9	√
1002	9	√
1316	10	√
1315	2	√
1404	7	√
1002	7	√
2303	5	√
1314	4	√
1408	11	√
1411	12	√
1405	1	√
1405	29	√
1002	12	√
2205	2	√
1406	8	√
1003	4	√

PROPERTIES WITHIN CLASSIFICATION EXCEPTION AREA
PUCHACK WELL FIELD SUPERFUND SITE
PENNSAUKEN, NEW JERSEY

BLOCK	LOT	Check if Off-Site
1413	4	√
1413	2	√
1406	1	√
1104	35	√
1507	5	√
1104	31	√
1002	2.01	√

BLOCK	LOT	Check if Off-Site
1316	9	√
1316	2	√
1316	12	√
1407	25	√
7004	10	√
1305	2	√
1102	20.01	√

ATTACHMENT 2
SITE HISTORY AND FATE AND TRANSPORT EVALUATION

Puchack Well Field Superfund Site
Site History and Fate and Transportation Evaluation
Classification Exception Area

The Puchack Well Field Superfund Site (the Site), located in Pennsauken Township, Camden County New Jersey, occupies over 180 acres of almost entirely urban land, as shown in Figure 1. The Puchack Well Field consists of 6 municipal water supply wells within the site area. Use of these wells ceased in 1984 due to the presence of contamination caused by historical industrial discharges in the area. This Classification Exception Area (CEA) documents the chromium contaminant plume, one of the constituents impacting the Puchack Well Field. The New Jersey Department of Environmental Protection (NJDEP) Ground Water Quality Standard (GQS) for chromium is 70 µg/L; the maximum chromium concentration observed from 2014 to 2017 was 22,000 µg/L.

The Site was placed on the National Priority List (NPL) on March 6, 1998, and is being remediated by the United Stated Army Corps of Engineers (USACE). Investigations and remediation are being managed by the Environmental Protection Agency (EPA) under two operable units. Operable Unit (OU) 1 includes investigation and remediation of the contaminant groundwater plume; this CEA has been prepared under OU-1. OU-2 includes investigation and remediation of the source areas of the plume. These investigations have determined that the SGL Modern Hard Chrome Facility (SGL) is the source of chromium contamination in the area.

Active in-situ remediation has been performed in select areas of the Site by the injection of sodium lactate into the Middle, Intermediate Sand and Lower aquifer units. These injections have been observed to increase sodium concentrations in these areas. Maximum ambient sodium concentrations observed from site data sometimes exceed the GQS of 50,000 µg/L, with a maximum ambient sodium concentration of 98,500 µg/L. Post-injection concentrations have been observed to be as high as 2,390,000 µg/L. Based upon the ambient sodium data, water quality in the aquifer is not expected to reach the GQS over time; however, sodium is included in the CEA because treatment levels are significantly higher than ambient levels.

Active public water supply wells include the Morris and Delair Well Fields, to the northwest of the site, the Park Avenue Well Field, approximately one mile east of the site, and the National Highway Well Field approximately one mile northeast of the site. The Park Avenue, Delair, and National Highway well fields continue to operate, with chromium concentrations below the GQS for chromium. The Morris wellfield has had detections of total chromium that exceed the GQS; however, additional source(s) of chromium in this area, unrelated to the Puchack Well Field Superfund Site or SGL, may contribute to these exceedances. Figure 1 shows the Puchack Well Field Superfund Site, its source area (SGL), the surrounding area and well fields.

The Puchack groundwater model was used along with water quality and water level data to estimate the duration and extent of the CEA, which documents the present-day extent of exceedances of chromium GQS, the expected duration required for chromium concentrations to decrease to the GQS, and the expected maximum extent of the chromium plume over the duration of the CEA.

The Puchack groundwater model was developed originally by the USGS (Pope and Watt, 2004) and has since been adapted by the Army Corps of Engineers for use on the Puchack wellfield superfund site remedial design. The model is 3-dimensional and incorporates the stratigraphic units that have been impacted by the hexavalent chromium release at the superfund site. As documented in Pope and Watt, 2004, these units have been assigned an alpha-numeric code and a name as follows (from shallowest to deepest):

- Upper aquifer: A-1
- Confining unit 1: (C-1)
- Middle aquifer, upper sand: A-2A
- Middle aquifer, confining unit: A-2CI
- Middle aquifer, lower sand: A-2B
- Confining unit 2, upper: C-2A
- Intermediate sand: C-2AI
- Confining unit 2, lower: C-2B
- Lower aquifer, upper zone: A-3A
- Lower aquifer, middle zone: A-3B
- Lower aquifer, lower zone: A-3C

Historical chromium contamination is present in the Middle aquifer (originating at the SGL Modern Hard Chrome Facility (the Source)), Intermediate Sand and Lower aquifer, where the Puchack Well Field supply wells pumped in the past. Following the cessation of pumping from the Lower aquifer Puchack Well Field supply wells, flow directions and gradients shifted from converging on the Puchack Well Field to flowing predominantly north/northwest towards the Morris and Delair well fields. A small portion of the eastern Site flows east/northeast, entering a stagnation zone generated by pumping at the Morris, National Highway, and Park Ave well fields. Flow into and through the stagnation zone is very slow. Ongoing in-situ remediation by sodium lactate injections is targeting hexavalent chromium mass along this pathway, with the intent of mitigating impacts to those downgradient receptors.

To estimate the aerial extent of the CEA, measured 2017 hexavalent chromium concentrations were used to establish the present-day extent of exceedances greater than 70 µg/L in the Lower Sand B/C aquifer (A-3B/A-3C), the Lower Sand A aquifer (A-3A), the Intermediate Sand (C-2AI), and the Middle aquifer (A-2B) units, contours of which are shown in Figure 2. The model then used these concentrations as the starting conditions in simulations designed to project the movement of hexavalent chromium over the next 200 years, utilizing present-day pumping and aquifer recharge conditions. Simulated chromium moves with the flow of groundwater, governed by Darcy's Law. Under present-day conditions, the predominant flow path is towards

the Morris Well Field. The simulated maximum extent of exceedances greater than 70 µg/L is shown for each segment of the plume in Figure 3. The CEA is the combined maximum extent of the exceedances and is shown in Figure 4, along with the cross section lines for the three sections included in Figure 5. Present-day flow direction arrows are depicted in Figures 6 (plan view) and 5 (cross section).

The following assumptions were made:

- Treatment of the hexavalent chromium plume in the Lower Sand B/C aquifer is ongoing and nearing completion. Assuming treatment is effective, the expected maximum plume extent is equivalent to the present-day extent.
- Treatment of the hexavalent chromium plume in the Lower Sand A aquifer is expected to be completed within 5 years. The model was run for 5 years to determine the expected maximum plume extent. After 5 years from now, the plume is expected to be fully remediated to below 70 µg/L.
- Treatment of the hexavalent chromium plume in the Intermediate Sand is currently not planned. The model was run for 200 years to determine the expected maximum plume extent.
- Treatment of the hexavalent chromium plume in the Middle aquifer is expected to be completed within 5 years. The model was run for 5 years to determine the expected maximum plume extent. After 5 years from now, the plume is expected to be fully remediated to below 70 µg/L.
- No retardation, transformation, or decay is simulated for hexavalent chromium
- An effective porosity of 0.2 was used in model simulations
- Back diffusion of mass that is entrained and functionally immobilized in confining units is not simulated
- 2017 monthly pumping rates and recharge values were used in the model simulations

The expected duration required for plume constituent concentrations to decrease to the GQS varies by stratigraphic unit as follows:

- Lower Sand B/C: Less than 5 years due to ongoing treatment via injection of sodium lactate
- Lower Sand A: Less than 5 years due to planned treatment via injection of sodium lactate
- Intermediate Sand: Approximately 85 years. However, the mass that remains long-term is simulated to have left the Intermediate Sand, being pulled down into the underlying confining aquitard (as a result of pumping from the Lower Sand aquifers) where groundwater flow is limited.

- Middle aquifer: Less than 5 years due to planned treatment via injection of sodium lactate

It is not necessary to simulate sodium concentrations to estimate the extent and duration of the CEA. Sodium lactate injected for in-situ remediation represents a small mass injected within the larger plume, that is subject to the same groundwater flow field governing the chromium plume. The CEA can be removed once chromium concentrations reach the GQS and sodium concentrations return to ambient levels.

In addition to the plan view and cross section figures included in this memo, a GIS-compatible plan view map of the CEA has been submitted to NJDEP to satisfy the requirements of the CEA.

References

Pope, D.A., and Watt, M.K., 2004, Simulation of Ground-Water Flow in the Potomac-Raritan Magothy Aquifer System, Pennsauken Township and Vicinity, new Jersey: United States Geological Survey Scientific-Investigations Report 2004-5025, 49 p.

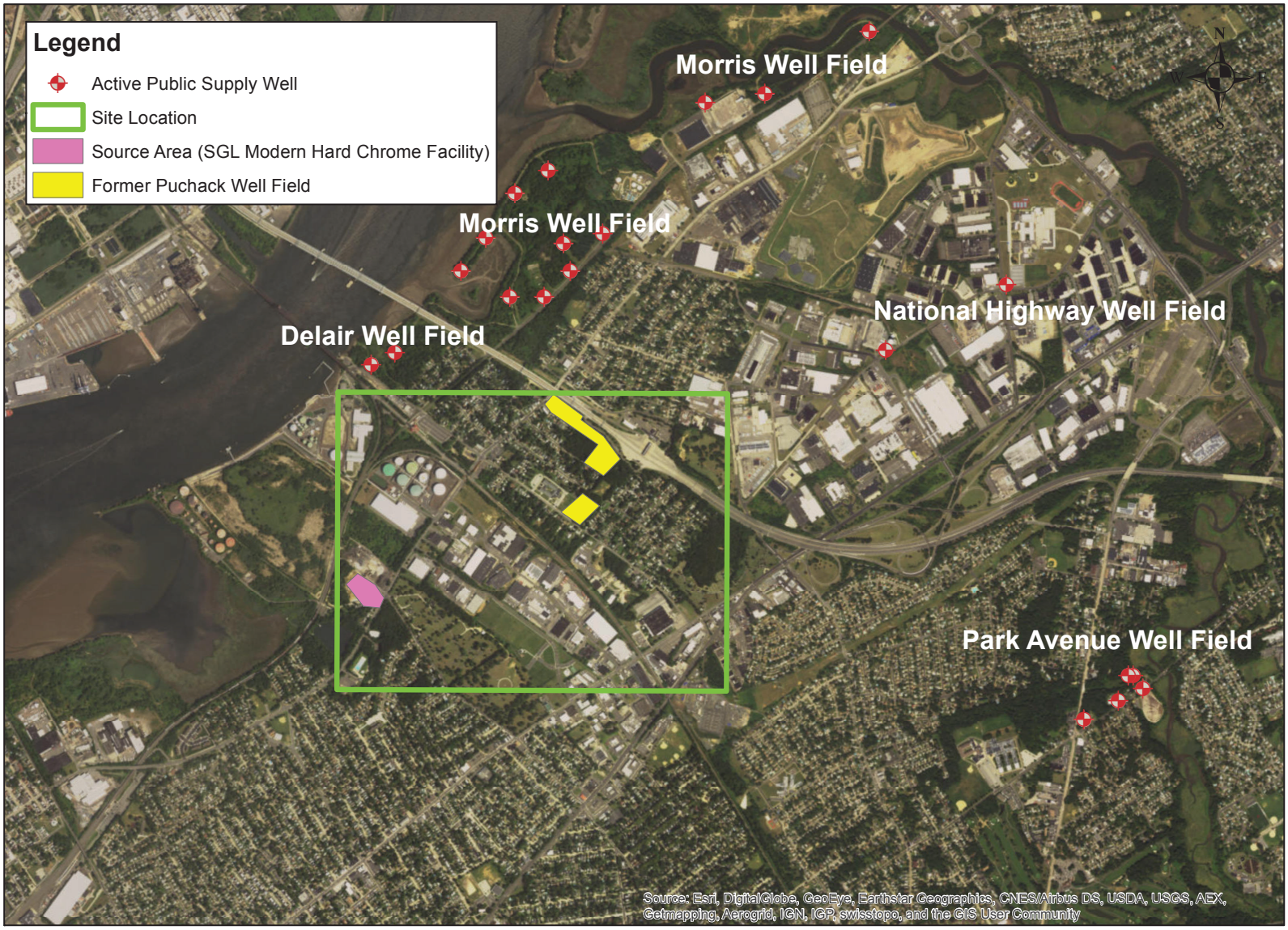


Figure 1
Puchack Well Field Site and Surrounding Area

0 750 1,500 3,000 Feet

CDM Smith

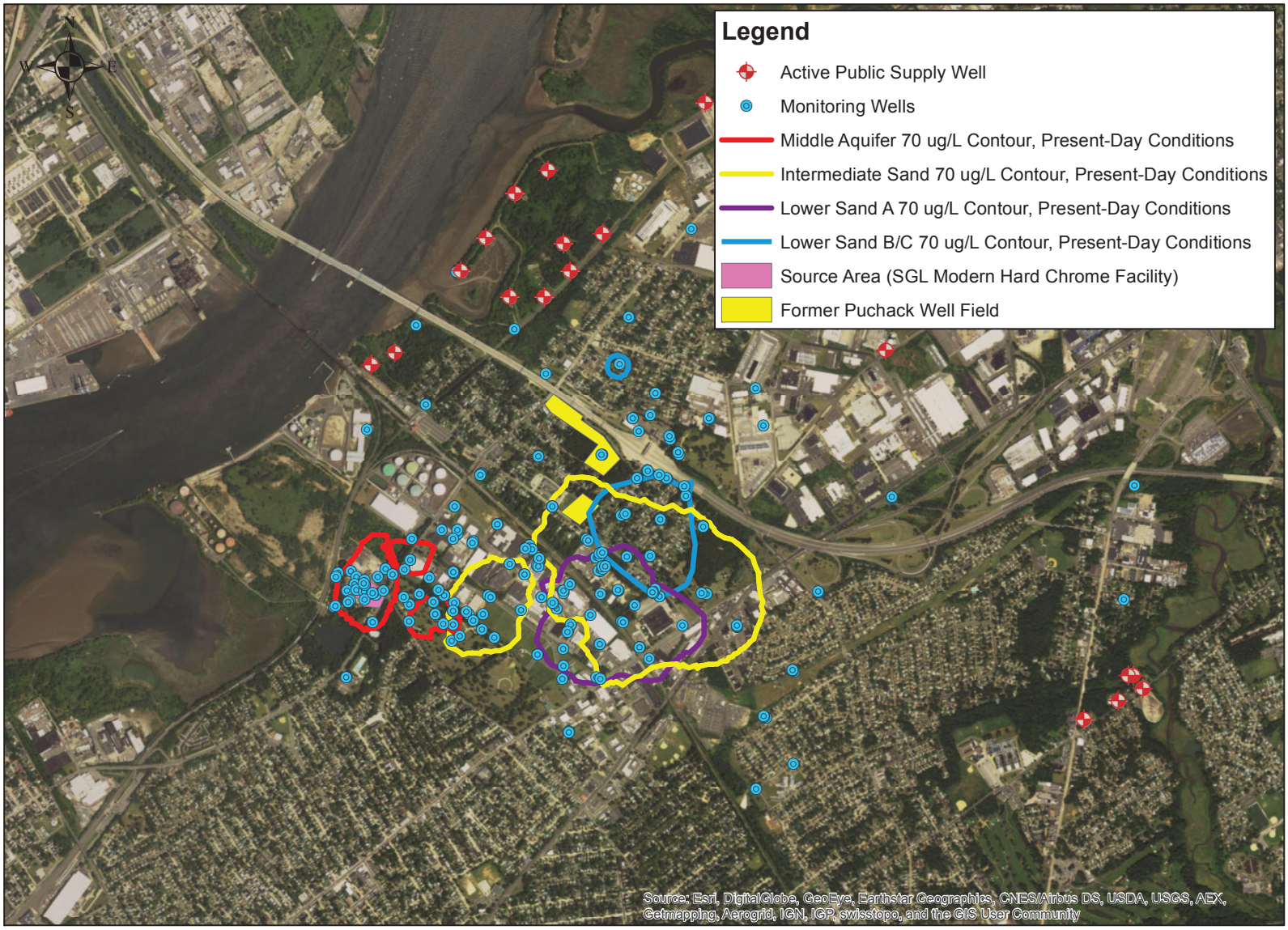


Figure 2
Present-Day Extent of Hexavalent Chromium > 70 ug/L

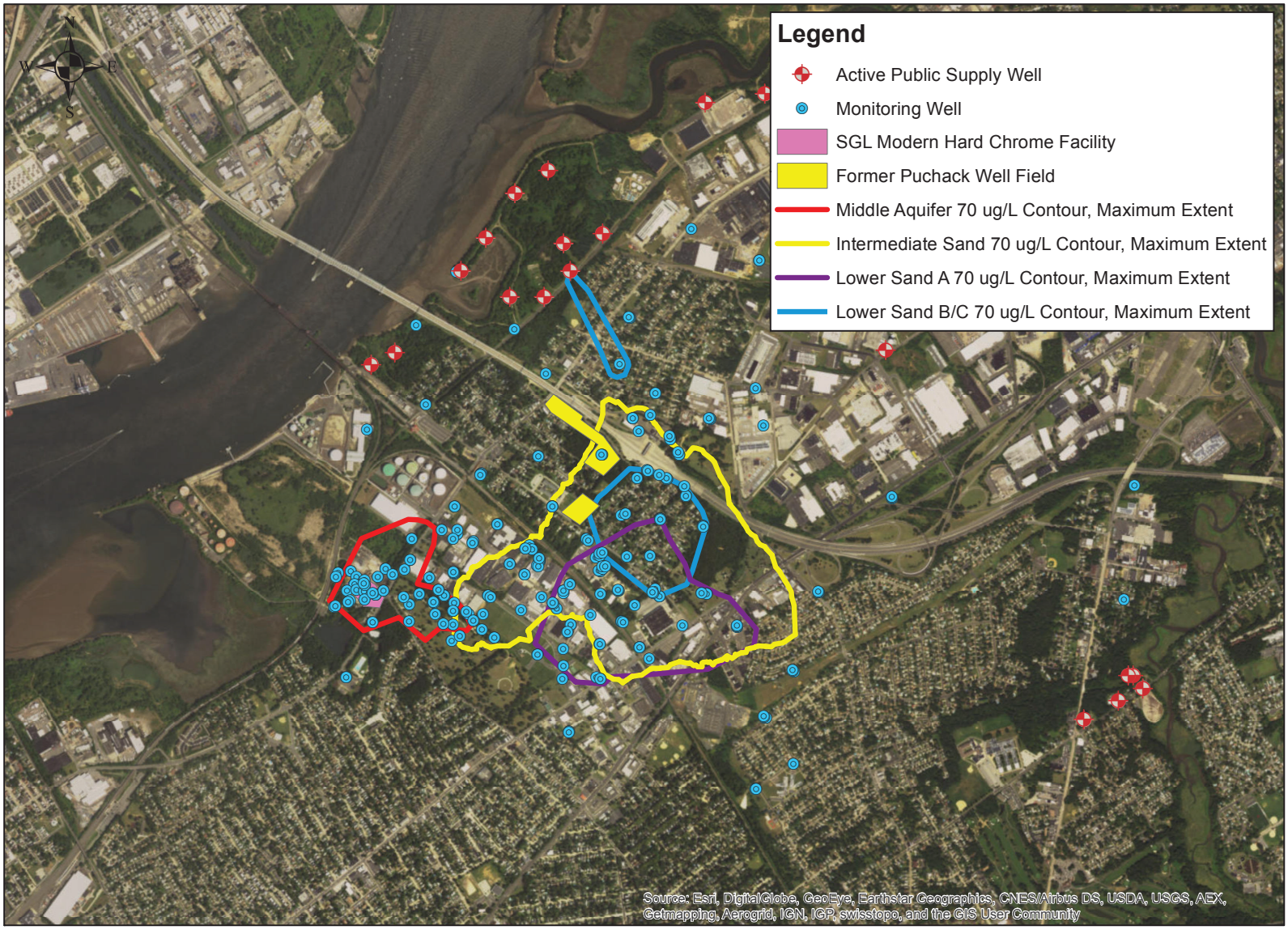


Figure 3
Maximum Extent of Hexavalent Chromium > 70 ug/L

0 750 1,500 3,000 Feet

CDM Smith

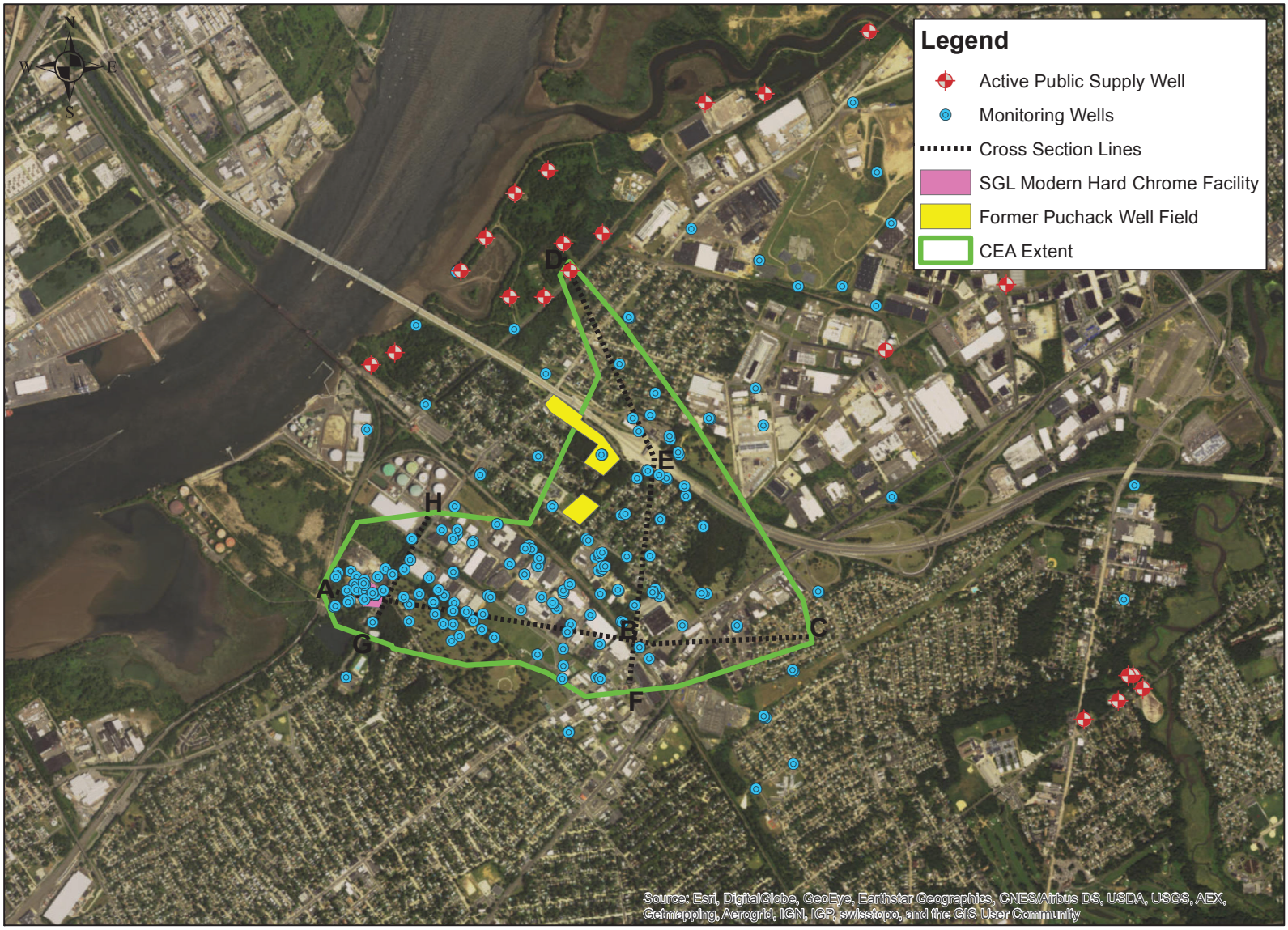


Figure 4
CEA Extent of Hexavalent Chromium > 70 ug/L with Cross Sections Lines

0 750 1,500 3,000 Feet

CDM Smith

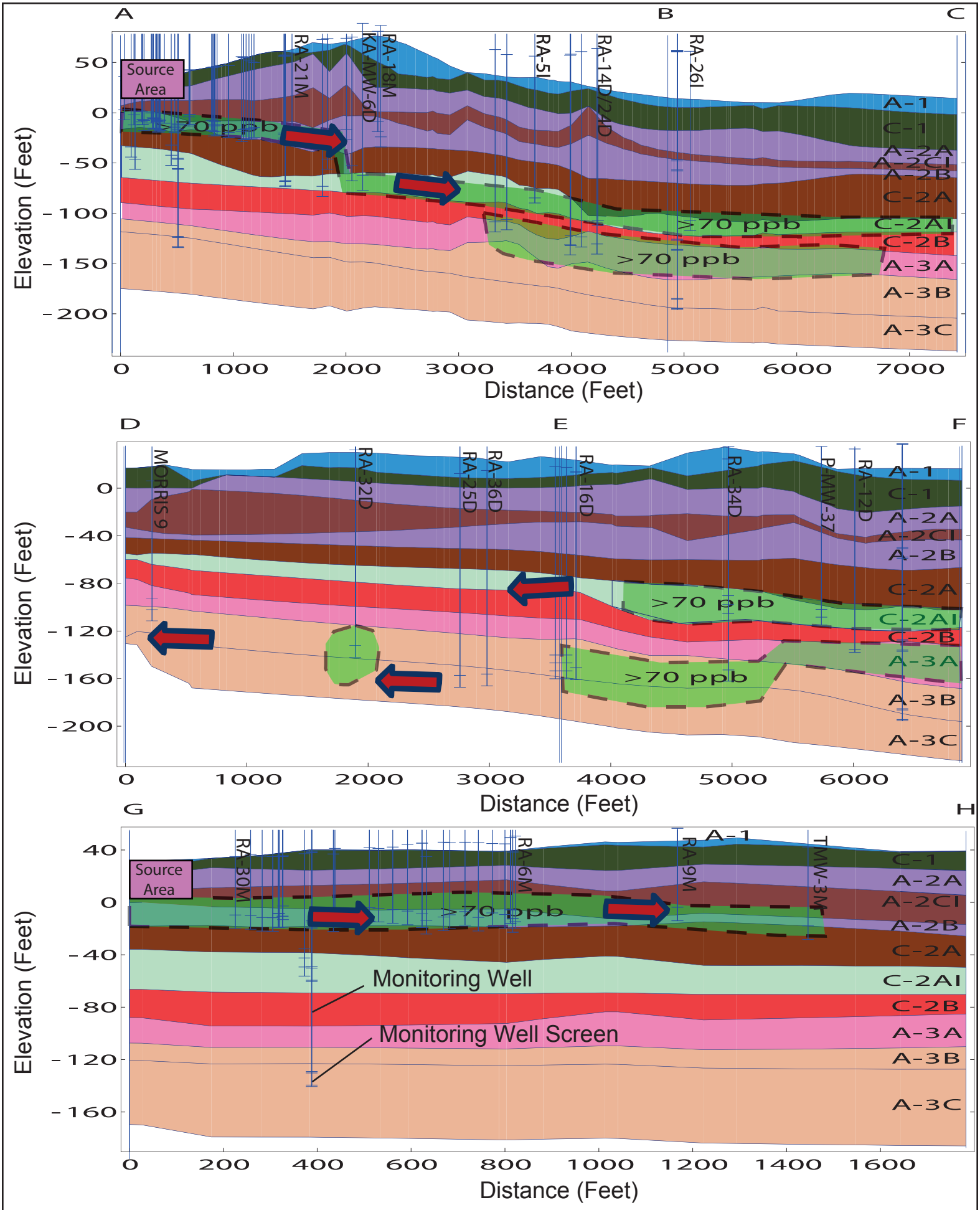


Figure 5
Cross Sections with Flow Directions

CDM Smith

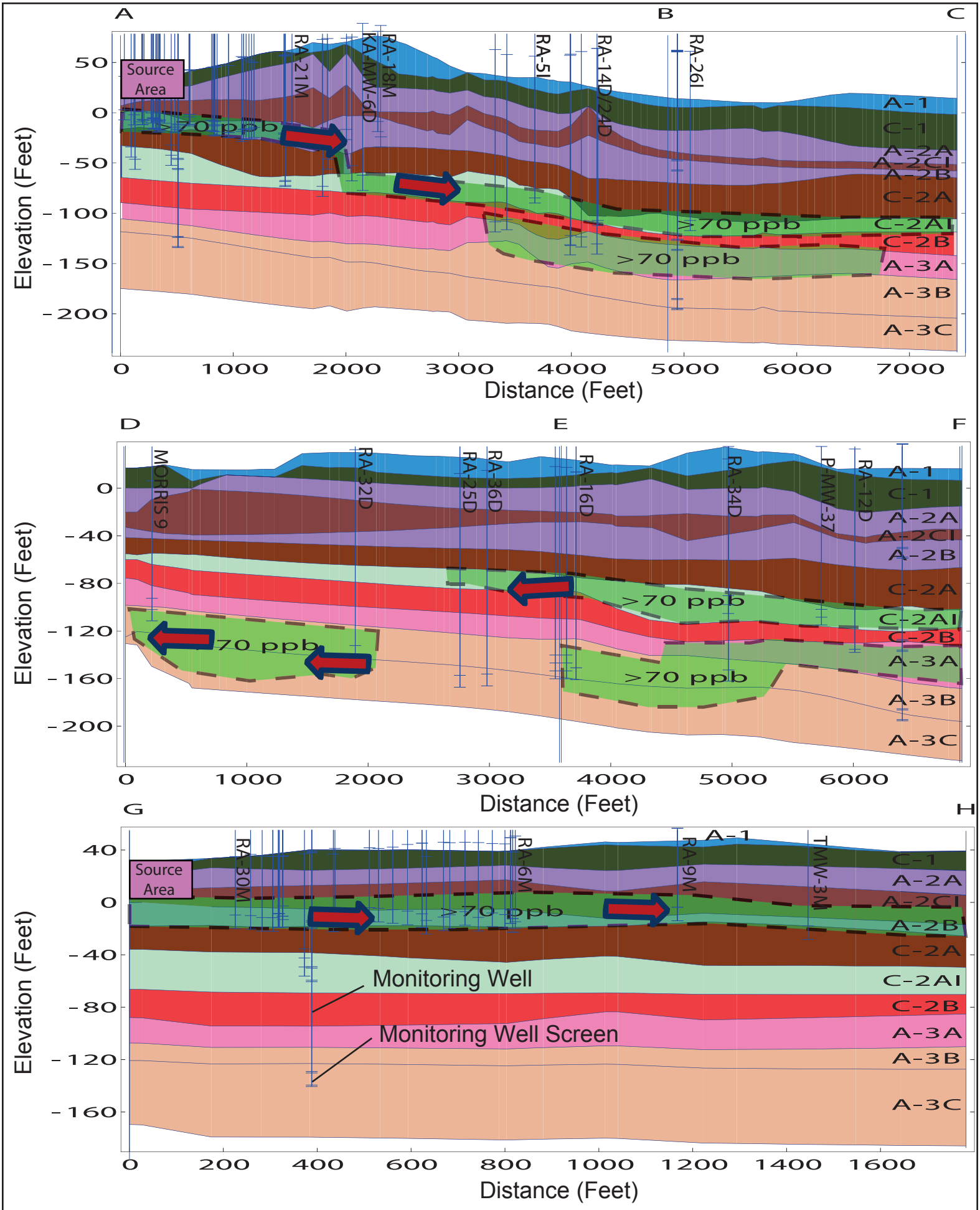


Figure 6
Cross Sections with Flow Directions

Figure 7
CEA Extent with Predominant Groundwater Flow Direction (Current Conditions)

s

CDM Smith®
cdmsmith.com